Communicating your science

I Protein engineering summary

II Systems engineering research article
III Systems engineering journal club presentation

3/17/16

Protein engineering summary

- Revision due: Monday, March 28th by 5pm

- Grade can increase by up to 1 and 1/3 of a letter grade
  - For example, a draft grade of a C can be increased to a B+

- Open office hours on Sunday, March 27th
  - Details to come concerning time and location

As you prepare your final summary

- Background and Motivation should include a preview of your key results
- Implications and Future Work should include a summary of your key results
- Transitions should be included between results

As you prepare your final summary

- When reporting your titration assay results you should include which model you used
  - Provide reasoning for choice
  - Include equation with explanation
- Avoid showing multiple data analysis methods without appropriate justification
- Do not repeat data plots in multiple figures

Systems engineering research article

- Submission due: Monday, April 18th by 5pm

- Completed individually
- Only one draft
- Formatting guidelines:
  - Prepare using WORD
  - Text and figures may be separate documents

How will we communicate our science?

- Research article structure more formal
  - Title and Abstract
  - Introduction
  - Methods
  - Results
  - Discussion
- Complete sentences and paragraphs
- References

How will you organize your methods?

Let's first review the methods homework from Mod 1…

1. Sub-sections
2. Level of detail
3. Language choices

Methods: sub-sections

1. Generation of X#Z mutation in IPC gene
   - pRSET-IPC template diagnostic digest, SDM reaction, plasmid isolation from NEBα cells, sequencing confirmation
2. Induction and purification of protein
   - Transformation of BL21(DE3)pLysS cells, induction, purification
3. Analysis of purified protein
   - SDS-PAGE, MicroBCA
4. Examination of calcium binding
   - titration assay, data analysis

Methods: level of detail

Methods: language choices

- the insert vs. IPC
  - Give your products names
- combined or mixed vs. digested
  - Be precise about the procedure used
- cleaned vs. purified or isolated
  - Use the more scientific terminology
- Avoid jargon
- Consider combining steps into concise sentences…

Example sentence from lecture:

Resulting fragments were separated using gel electrophoresis (130 V for 45 min) then X bp NHEJ reporter band was gel purified with Qiagen …(manufacturer).

1. PUT THE SUBJECT OF THE SENTENCE FIRST
2. BE SURE THE SUBJECT AND THE VERB MATCH

What are your data?

How will you report your data?

Results and Figures [edit]

Individual versus class-wide data [edit]

You should present just your individual results for all of the validation experiments. You may *briefly* comment on class-wide consistency if you wish. For the investigative flow cytometry experiment, you should include the class data.

Suggested figures [edit]

The suggested list of figures below should be suitable for most of your write-ups (not necessarily in this order!), but you are welcome to make additions/deletions/modifications as you see fit. Be sure to present the data in **whatever progression you feel tells the most logical story**. Remember that the order of our experiments does not necessarily correspond to the best way to tell the story of this investigation.

- Schematics/diagrams
  - Overall approach (not every single method to get there!) and question being asked
  - Often the overview schematic is designed to support the first/overview paragraph of the Results section
- Figures

How will you interpret your data?

Discussion [edit]

This section should realize all the good practices described in the Module 1 assignment in regards to concisely stating conclusions about your research, but do so at a more advanced level. You will be expected to cite the broader scientific literature more thoroughly than before, both to set up your investigative question in the introduction and to inform your analysis in the discussion. You should also propose specific future experiments and otherwise show that you deeply understand the meaning and significance of your results; for example, if you have a hypothesis about why a DNA topology had the relative repair frequency that it did, consider what follow-up experiments you might try. Also, make sure to do a bit of literature digging to determine if your results have any precedent or if your experiments are contrary to what has been reported. Modest speculation as to why that it the case is *highly* encouraged. The best scientific writers are creative in their discussion sections – convincing their readers that whatever the results, the study was interesting and contributes to forward movement of the field.

The discussion will be evaluated by Dr. Leona Samson and will account for 10% of the final grade for this assignment.

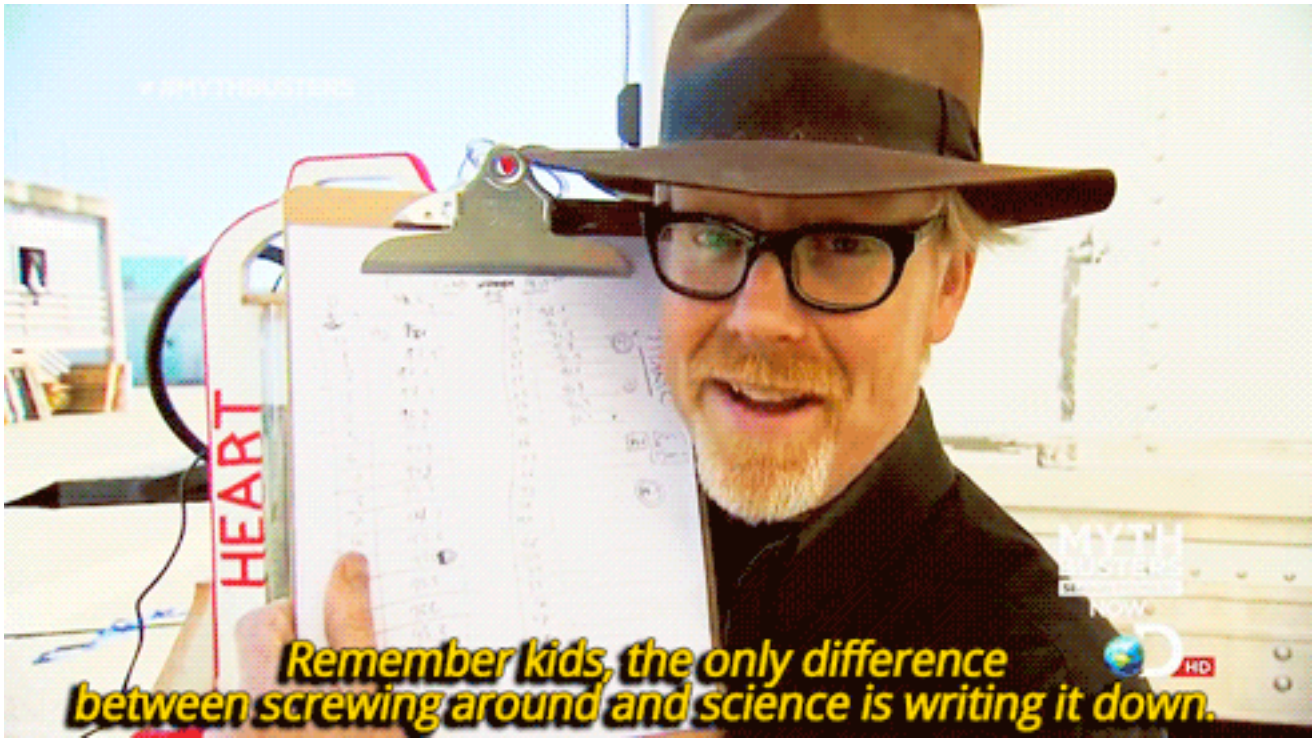
Reporting and interpreting your data

RESULTS

1. What was the overall goal of these data?
   - State concisely as an introductory sentence.
2. If applicable, what was the result of your control?
   - Was it expected?
3. What was your result?
   - Was it expected?
4. What does this motivate you to do next?
   - Specifically, what experiment follows?

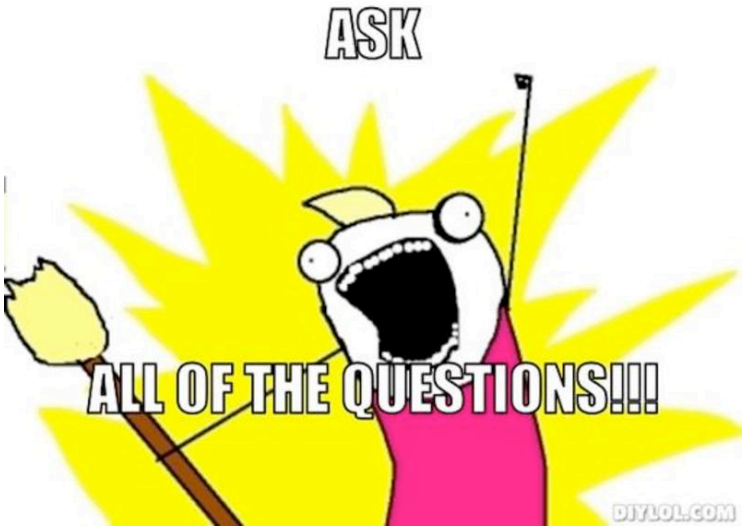
DISCUSSION

1. What evidence do you have that your result is correct or incorrect?
   - How do your controls support your data?
2. In sum, what do your data suggest or indicate?
   - Do your data support your hypothesis? Why?
3. What does this motivate you to do next?
   - Specifically, what is the next research question?


HEART
Remember kids, the only difference
between screwing around and science is writing it down.
MYTH
HD

Laboratory will meet in 16-336

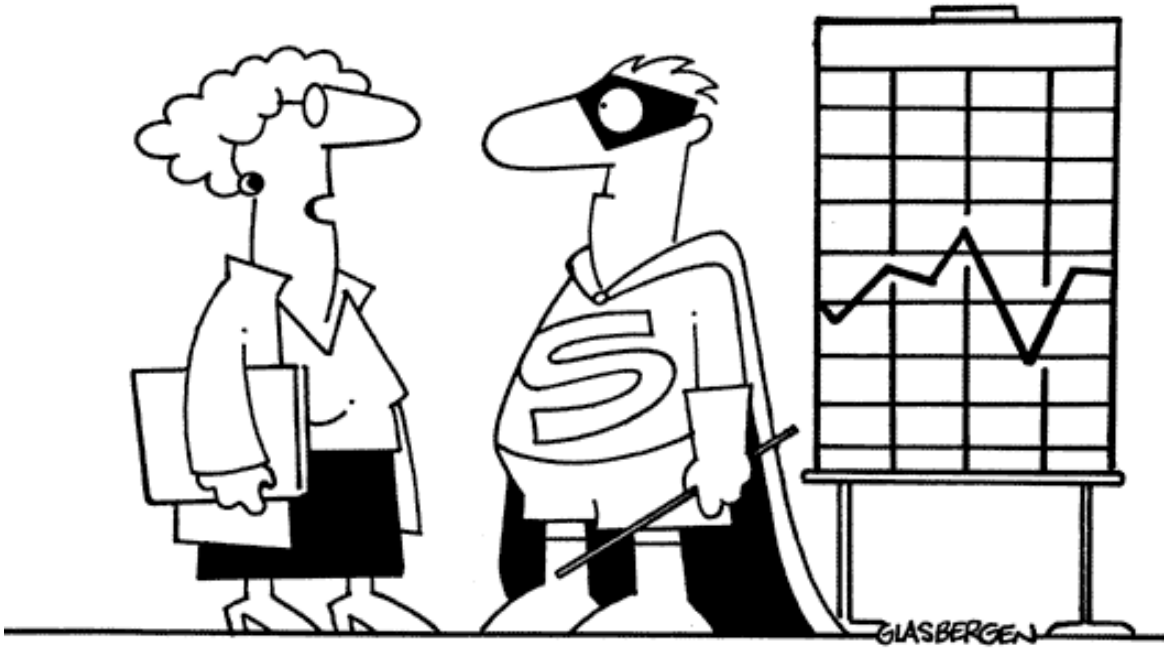
- Speakers
  - Please arrive early, if possible, to check the formatting of your slides
  - Laser pointer, slide changer, timer available for use
- Audience members
  - Please arrive on time
  - Enjoy snacks quietly and no refills during the presentations



How can I overcome my fear of public speaking?

1. Know your topic
2. Get organized
3. Practice, practice, practice
4. Visualize success
5. Deep breathing
6. Get support

MAYO CLINIC



"Fear of public speaking is quite common. If dressing up as Speaker Man makes you feel more confident, then so be it."

Put your capes on!